COSMETIC
Outcomes Article

Male-to-Female Sex Reassignment Surgery Using the Combined Technique Leads to Increased Quality of Life in a Prospective Study

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Background: The authors' previous research showed that various plastic surgical procedures can increase a patient's quality of life in its different aspects. In a prospective setting, they evaluated whether sex reassignment surgery has similar effects for male-to-female transgender patients compared to baseline data before sex reassignment surgery.

Methods: All 39 patients who underwent their first-stage male-to-female sex reassignment surgery between October of 2012 and January of 2014 received one set of questionnaires preoperatively (time 0) and approximately 6 months after their final operation (time 1). Each set contained self-developed, indication-specific questions combined with the standardized validated Questions on Life Satisfaction, Modules (German version) questionnaire, the Freiburg Personality Inventory, the Rosenberg Self-Esteem Scale, and the Patient Health Questionnaire, which were compared to available norm data.

Results: The mean patient age was 38.6 years. The majority of the patients were highly educated, childless, and single. Significant improvements were found in the Questions on Life Satisfaction, Modules (German version), especially for the items "partnership," "ability to relax," "energy," "freedom from anxiety," "hair," "breast," and "penis/vagina" ($p < 0.01$). Furthermore, the patients appeared more emotionally stable ($p = 0.03$), showed higher self-esteem ($p = 0.01$), and showed much lower depression/anxiety ($p < 0.01$).

Conclusions: The positive study findings were confirmed with the results from prior retrospective studies. However, medical literature focuses largely on surgical and functional satisfaction and not overall quality of life. In addition, standardized questionnaires are used rarely and solely retrospectively, with the risk of recall bias. The increased quality of life of transgender women postoperatively endorses sex reassignment surgery as a valuable option for these patients. (*Plast. Reconstr. Surg.* 140: 286, 2017.)

CLINICAL QUESTON/LEVEL OF EVIDENCE: Therapeutic, IV.

Any literature search will show that quality of life is a crucial part of modern day medicine. It is a well-established instrument and goal criterion to evaluate success rates of operations from a patient's point of view, especially after elective procedures. Opposite to the primary beliefs

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in the 1970s when examiners would evaluate a person's well-being by objective measurements, it is in fact only the patients who can truly judge the results after plastic surgery and thus assess their quality of life.[1] Health is naturally an integral component of this multidimensional concept. The World Health Organization defines health not only as an "absence of disease" but as a "state of complete … well-being."[2] Other aspects of quality of life include social, psychological, emotional, and spiritual components to assess a patient's state of happiness.[3,4] The desire to improve one's well-being is often the major indication for interventions in plastic surgery rather than the patient's interest for perfect physical appearance. Of course, quality of life can also be assessed preoperatively as baseline data to measure the effects of plastic surgery after a procedure.

The authors' previous studies and countless other international reports show that interventions in plastic surgery yield many improvements in different aspects of life. These studies also reveal lower levels of psychological distress in patients after surgery compared with preoperative or general norm data.[5,6]

The desire for a higher quality of life is naturally one of the many aspects of why people with gender dysphoria undergo sex reassignment surgery. According to the latest *Diagnostic and Statistical Manual of Mental Disorders: DSM-5* catalogue, gender dysphoria is defined as the distress that someone experiences who suffers from an extreme urge to belong to the opposite sex and would prefer to be addressed as such by others.[7] Occurrence figures do exist reporting a prevalence of one in 2900 to one in 100,000 for male-to-female transgender individuals in several Western countries, as a recent study showed.[8] However, we must consider the estimated number of unreported cases to be high because patients with gender dysphoria face the perils of financial, social, and occupational disadvantages along with discrimination if they decide to come out as transgender.[9]

Medical professionals have different possibilities to help these patients over their course of life, such as psychotherapy, hormone replacement therapy, and sex reassignment surgery, a term that includes a number of diverse procedures and techniques. No strict guidelines on how to combine these treatments exist yet and they can vary internationally. However, there is a broad agreement that patients who decide to undergo sex reassignment surgery need to have had successful psychotherapy and hormone replacement therapy in their past.[10,11] This article concentrates on the effects of sex reassignment surgery being the most invasive and for many patients the last hope for an increase in quality of life. The aim of this prospective study was to find out whether there are any measurable significant changes in various attributes of quality of life after male-to-female sex reassignment surgery using our combined two-stage surgical vaginoplasty technique.[12]

PATIENTS AND METHODS

With a set of questionnaires, we designed a prospective observational cohort study at our division of plastic surgery. We personally contacted all male-to-female transgender individuals to join our study who were about to undergo their first stage of sex reassignment surgery involving orchiectomy, penectomy, and vaginoplasty. Patients who had previously operated genitals or did not agree to enter the study were excluded. Between October of 2012 and January of 2014, 49 patients met our inclusion criteria and 47 consented to participate in our study before sex reassignment surgery.

The study participants received the first set of questionnaires in person at admission to the hospital, 1 day before their first stage of sex reassignment surgery (time 0). Next, the second stage of sex reassignment surgery was performed approximately 6 months later to address any cosmetic concerns, such as scar revisions or the removal of dog-ears. The second set was sent out by mail 6 months after the second stage (time 1) (Fig. 1). This follow-up period ensured enough time had passed for the patients to get accustomed to their final surgical results but also guaranteed high response rates postoperatively. Patients who did not send back the second questionnaire within 4 weeks were encouraged to do so by phone. On average, the questionings were separated by 11.3 ± 3.2 months. In this article, we present the results of the 39 patients who, ultimately, filled out both sets of questionnaires (return rate, 83 percent).

Thirty-four patients (87 percent) had two or more operations during the course of this study. The most common procedure besides the main genital surgery was breast augmentation, with 18 cases (46 percent). All operations were performed by the same board-certified plastic surgeon, who has decades of experience in both male-to-female and female-to-male, genital and nongenital, sex reassignment surgery. The patients were not reimbursed financially for joining this study, and their surgical treatment was unaffected by our research. The work described in this article was approved by

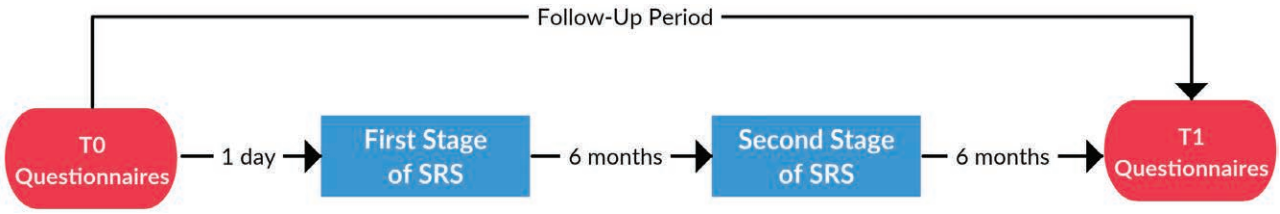

Fig. 1. Graphic illustration of patient questioning and surgery timing. *T0*, admission to the hospital, 1 day before the first stage of sex reassignment surgery; *SRS*, sex reassignment surgery; *T1*, 6 months after the second stage.

our university's ethics committee (approval number 252/14 TUM). The authors adhered to the Declaration of Helsinki at all times.

Operative Technique

First, orchiectomy, penectomy, and separation of the urethra from the penile skin and neurovascular bundle and its glans penis is performed. The spatulated urethra and a scrotal skin graft then join the penile skin flap to form the neovagina within the previously dissected cavity between the prostate and the rectum. This procedure is therefore referred to as a combined technique because we use all tissue available in our reconstructive process. It achieves favorable vaginal depth and width, leads to pleasing lubrication, and guarantees a cosmetic mons pubis by decreasing tension to the lower abdomen, in contrast to the penile invagination technique. For a detailed operative description, we refer to our separate report.[12]

Questionnaires

Both the preoperative and postoperative questionnaires included a number of self-developed indication-specific questions about the socioeconomic and demographic characteristics of our participants, and the Questions on Life Satisfaction, Modules (German version) developed by two consulting colleagues in our Department of Psychosomatic Medicine.[13] Additional questionnaires were the Freiburg Personality Inventory,[14] the Rosenberg Self-Esteem Scale,[15] and the Patient Health Questionnaire.[16] Patient data from all these standardized and validated tests can be compared to norm data collected during large surveys of a general population.

The Questions on Life Satisfaction, Modules (German version) is a standardized instrument for German-speaking countries to measure a patient's weighted quality of life subjectively. It consists of three modules: General Satisfaction, Health Satisfaction, and Satisfaction with Outer Appearance (also known as Body Image). In every module, the patient evaluates each subitem for its subjective importance and degree of satisfaction, resulting in a total score between −12 and 20 for any item. Furthermore, each module comes with a sum score representing the total of all its items. Numerous research groups use this questionnaire in the medical literature because it allows them to compare patient data to those of existing norm populations (general, $n = 2562$; health, $n = 2226$).[13]

Another popular instrument used in quality-of-life research is the Freiburg Personality Inventory. It consists of 12 modules yielding to a total of 138 statements that the participants are to mark as "correct" or "incorrect." In our study, we chose only the module Emotionality with its 14 items to get a closer look at our patients' emotional situation, stress management abilities, anxiety, and character. German norm data ($n = 2035$) are available in the medical literature,[14] and study results can be interpreted as very emotionally stable (score of 0 to 4), stable without behavioral issues (5 to 7), and problematically unstable (8 to 14).

The Rosenberg Self-Esteem Scale is a short, standardized questionnaire used internationally to analyze the self-esteem of study participants. Its most common version applied in research consists of 10 items and awards 1 ("strongly disagree") to 4 ("strongly agree") points, each leading to a total score between 10 and 40. The authors do not provide assistance for interpretation, yet one can derive some information from a study that collected norm data for 53 different countries (Germany, $n = 782$; total, $n = 16{,}998$).[17] Values higher than 30 are usually regarded as indicating high self-esteem.

Depressive symptoms were assessed using the German version of the four-item Patient Health Questionnaire-4, which is a construct of the Generalized Anxiety Disorder scale and the Patient Health Questionnaire-2. The Patient Health Questionnaire-4 is a self-report measure that provides both a diagnosis of a major depressive syndrome and a continuous severity score, and is based on the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Diseases, Fourth*

Edition, criteria for depressive episodes.[18] Participants rate each item based on how often they have experienced depressive feelings or thoughts in the past 2 weeks. The scale ranges from 0 ("not at all") to 3 ("nearly every day"). Total scores of 0 to 2 are considered unremarkable, whereas scores of 3 to 5, 6 to 8, and 9 to 12 indicate a mild, moderate, and severe depression, respectively.[16] This short and simple test allows us to compare our patient data before and after sex reassignment surgery and to the German population, as norm data are available ($n = 5003$).[19]

Statistical Analysis

For the statistical analysis of the data, we used IBM SPSS Version 21 (IBM Corp., Armonk, N.Y.). For all tests, the statistical level of significance was set at 5 percent or less using the (un)paired sample t test. Histograms of our data were analyzed visually to ensure normal distribution.

RESULTS

Self-Developed Questionnaire

The mean age of our patients at the time of the first stage of surgery was 38.6 ± 12.8 years (range, 19 to 66 years). We noticed two peaks in the graphic analysis of the age distribution: midtwenties and late forties (Fig. 2). According to our preoperative questionnaire, the average time our patients lived with a female identity before the first operation was 3.0 ± 1.5 years. The majority of our patients were single by civil law (62 percent), lived alone or with a partner (69 percent), and did not have children (64 percent). The majority (59 percent) had an education of either a high school or a university degree.

All of the study participants had sessions of psychotherapy preoperatively, as it is mandatory according to German law and is required by German health insurance providers for receipt of financial coverage for services rendered.[20] The average period of psychotherapy was 28.7 months, and 76 percent of the patients agreed that those sessions were "helpful." However, only 24 percent attended therapy after their second operation.

Questions on Life Satisfaction Questionnaire

In the module General Satisfaction, our patients had significantly higher scores for the items "hobbies" ($p = 0.03$), "health" ($p = 0.01$), and "partner relationship" ($p < 0.01$), and a significantly higher sum score ($p < 0.01$) after sex reassignment surgery. Regarding the provided norm data, four of the time-0 scores were significantly lower and two time-1 scores were significantly higher. Point values for "income" and "family life" remained below the German population even after surgery (Table 1).

Considering the results of the second module, Health Satisfaction, we discovered significant postoperative improvements for the items "ability to relax" ($p < 0.01$), "energy" ($p < 0.01$), "mobility" ($p = 0.04$), and "freedom from anxiety" ($p < 0.01$), in addition to a higher sum score ($p < 0.01$). Four

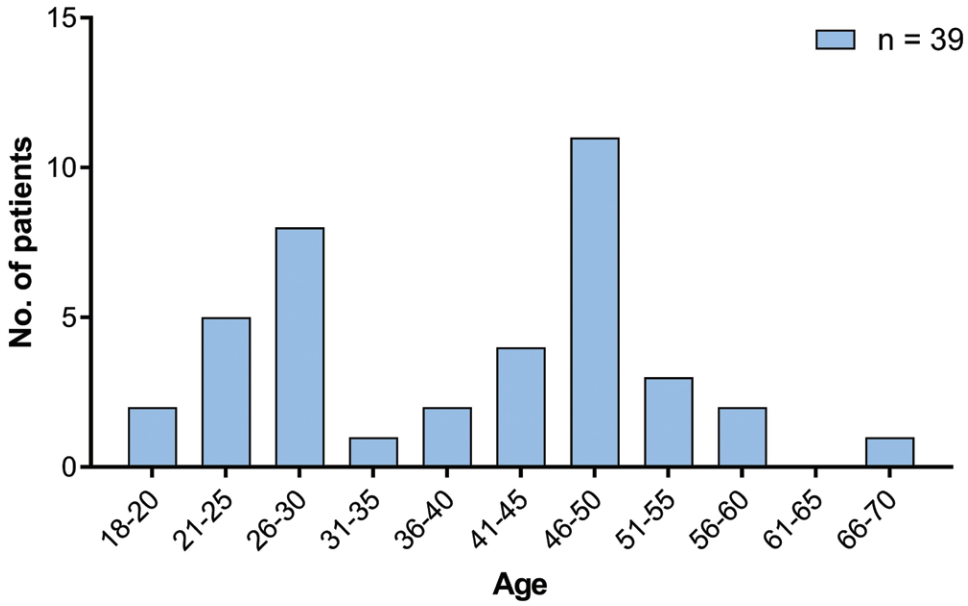

Fig. 2. Age distribution of the study group at the time of the first stage of sex reassignment surgery.

Table 1. Weighted Results for the Questions on Life Satisfaction, Modules: General Satisfaction*

	Study Group T0			Study Group T1		Norm Data 1994†			*p* (*t* Test)		
	No.	Mean	SD	Mean	SD	No.	Mean	SD	T0 vs. T1	T0 vs. Norm	T1 vs. Norm
Friends	39	9.26	6.94	10.41	6.11	2536	8.08	6.33	0.26	0.25	0.02‡
Hobbies	39	4.54	6.26	7.18	6.64	2531	6.31	6.36	0.03†	0.08	0.40
Health	39	8.23	7.86	11.41	7.14	2541	8.06	7.51	0.01†	0.89	0.01‡
Income	39	2.97	7.08	3.44	6.87	2537	6.49	7.27	0.66	<0.01‡	0.01‡
Work	39	4.26	7.12	5.46	7.56	2462	5.45	7.3	0.41	0.31	0.99
Living conditions	39	7.87	6.20	8.41	7.68	2533	8.33	6.4	0.68	0.66	0.94
Family life	39	5.18	8.00	7.15	9.30	2519	9.84	6.94	0.20	<0.01‡	0.02‡
Partner relationship	39	−2.26	6.29	6.18	10.31	2509	7.90	7.69	<0.01†	<0.01‡	0.17
Sum score	39	40.05	26.70	59.64	30.09	2534	60.49	37.13	<0.01†	<0.01‡	0.89

T0, time 0; T1, time 1.
*Data from Henrich G, Herschbach P. Questions on Life Satisfaction (FLZM): A short questionnaire for assessing subjective quality of life. *Eur J Psychol Assess.* 2000;16:150–159.
†Statistically significant difference with $p < 0.05$ (paired *t* test).
‡Statistically significant difference with $p < 0.05$ (unpaired *t* test).

items were significantly worse at baseline compared with norm values. However, these time-0 findings could not be reproduced during the time-1 interviews after surgery (Table 2).

Regarding the third module, Body Image, seven of 22 items and the sum score delivered significantly increased results after surgery, with the highest improvements for "hair" ($p < 0.01$), "breasts" ($p < 0.01$), and "penis/vagina" ($p < 0.01$) (Table 3).

Freiburg Personality Inventory

The results from the time-1 questionnaire demonstrated a very high emotional stability of our study patients at an average test value of 4.72. Compared with both our preoperative ($p = 0.03$) and the German norm data ($p = 0.01$), this score was significantly improved after surgery (Table 4).

Rosenberg Self-Esteem Scale

The Rosenberg Self-Esteem Scale questionnaire revealed strongly increased self-esteem after surgery ($p = 0.01$), with an average score of 35.03 being significantly higher than even the one of a general German population ($p < 0.01$). The baseline score was not statistically different from norm values, with a mean score of 32.54 being a strong indicator for high self-esteem (Table 5).

Patient Health Questionnaire

Before surgery, the results of the Patient Health Questionnaire-4 in our study group illustrated an elevated value of 3.95, which was significantly higher compared with norm data ($p < 0.01$) and suggested a mild depression and anxiety disorder. However, the following time-1 value of 1.79 was significantly lower ($p < 0.01$) and not statistically different from the same norm population (Table 6).

DISCUSSION

In our constant efforts to improve health care, a patient's quality of life is increasing in

Table 2. Weighted Results for the Questions on Life Satisfaction, Modules: Health Satisfaction*

	Study Group T0			Study Group T1		Norm Data 1995†			*p* (*t* Test)		
	No.	Mean	SD	Mean	SD	No.	Mean	SD	T0 vs. T1	T0 vs. Norm	T1 vs. Norm
Fitness	39	5.36	7.25	6.72	6.30	2220	8.09	7.01	0.18	0.02‡	0.23
Ability to relax	39	4.90	9.06	9.31	6.82	2214	7.40	6.50	<0.01†	0.02‡	0.07
Energy	39	5.51	7.28	10.46	6.59	2215	9.14	6.53	<0.01†	<0.00‡	0.21
Mobility	39	11.18	6.90	13.49	6.39	2210	9.07	6.96	0.04†	0.06	<0.01‡
Vision/hearing	39	10.05	7.09	10.72	7.40	2217	11.03	7.03	0.48	0.39	0.79
Freedom from anxiety	39	3.59	8.13	7.69	7.33	2204	8.10	6.71	<0.01†	<0.00‡	0.71
Freedom from pain	39	8.31	7.15	9.85	8.06	2217	9.10	7.39	0.25	0.51	0.53
Independence from help	39	12.85	7.44	12.23	7.95	2215	12.45	6.72	0.65	0.71	0.84
Sum score	39	61.74	40.33	80.46	37.62	2218	74.39	41.54	<0.01†	0.06	0.37

T0, time 0; T1, time 1.
*Data from Henrich G, Herschbach P. Questions on Life Satisfaction (FLZM): A short questionnaire for assessing subjective quality of life. *Eur J Psychol Assess.* 2000;16:150–159.
†Statistically significant difference with $p < 0.05$ (paired *t* test).
‡Statistically significant difference with $p < 0.05$ (unpaired *t* test).

Table 3. Weighted Results for the Questions on Life Satisfaction, Module: Body Image

		Study Group T0		Study Group T1		
	No.	Mean	SD	Mean	SD	*p* (*t* Test, T0 vs. T1)
Hair	39	5.59	10.1	9.21	9.50	<0.01*
Ears	39	7.31	5.83	9.26	7.06	0.06
Eyes	39	9.69	5.91	10.72	6.94	0.39
Nose	39	6.03	7.00	7.56	7.79	0.09
Mouth	39	7.28	6.97	9.28	7.18	0.05*
Teeth	39	6.38	5.46	7.38	7.28	0.32
Facial hair	39	−0.64	8.68	3.62	9.61	0.01*
Chin/neck	39	5.05	6.84	6.67	6.92	0.10
Shoulders	39	3.31	5.88	5.18	6.00	0.03*
Breasts/bosom	39	−0.49	8.53	8.92	9.01	<0.01*
Abdomen	39	0.00	6.04	3.51	7.58	0.01*
Waist	39	3.92	7.85	4.74	7.99	0.55
Hips	39	5.51	7.52	5.97	7.36	0.72
Penis/vagina	39	−10.03	3.05	14.36	6.30	<0.01*
Bottom	39	5.82	6.20	6.97	6.60	0.32
Thighs	39	4.97	5.45	6.46	6.41	0.21
Feet	39	4.41	6.22	5.44	6.60	0.29
Hands	39	5.03	7.06	6.62	6.72	0.07
Skin	39	5.87	7.42	8.49	7.29	0.06
Body hair	39	1.90	7.75	4.15	8.14	0.15
Size	39	5.74	6.75	6.33	6.69	0.60
Weight	39	3.82	7.73	4.26	8.32	0.75
Sum score	39	86.49	79.2	155.10	99.12	<0.01*

T0, time 0; T1, time 1.
*Statistically significant difference with $p < 0.05$ (paired *t* test).

Table 4. Results of the Freiburg Personality Inventory*

	No.	Mean	SD	*p* (*t* Test)
Study group				
T0	39	6.54	3.95	
T1	39	4.72	3.22	
Literature norm data†	2035	6.20	3.60	
T0 vs. T1				0.03†
T0 vs. norm				0.56
T1 vs. norm				0.01‡

T0, time 0; T1, time 1.
*Data from Fahrenberg J, Hampel R, Selg H. *Das Freiburger Persönlichkeits-inventar FPI. Revidierte Fassung FPI-R und teilweise geänderte Fassung FPI-A1*. Göttingen: Hogrefe-Verlag; 1994.
†Statistically significant difference with $p < 0.05$ (paired *t* test).
‡Statistically significant difference with $p < 0.05$ (unpaired *t* test).

Table 5. Results of the Rosenberg Self-Esteem Scale*

	No.	Mean	SD	*p* (*t* Test)
Study group				
T0	39	32.54	5.86	
T1	39	35.03	5.05	
German norm data†	782	31.73	4.71	
T0 vs. T1				0.01†
T0 vs. norm				0.30
T1 vs. norm				<0.01‡

T0, time 0; T1, time 1.
*Data from Schmitt DP, Allik J. Simultaneous administration of the Rosenberg Self-Esteem Scale in 53 nations: Exploring the universal and culture-specific features of global self-esteem. *J Pers Soc Psychol*. 2005;89:623–642.
†Statistically significant difference with $p < 0.05$ (paired *t* test).
‡Statistically significant difference with $p < 0.05$ (unpaired *t* test).

Table 6. Results of the Four-Item Patient Health Questionnaire*

	No.	Mean	SD	*p* (*t* Test)
Study group				
T0	39	3.95	2.54	
T1	39	1.79	2.00	
Norm data†	5003	1.76	2.06	
T0 vs. T1				<0.01†
T0 vs. norm				<0.01‡
T1 vs. norm				0.93

T0, time 0; T1, time 1.
*Data from Lowe B, Wahl I, Rose M, et al. A 4-item measure of depression and anxiety: Validation and standardization of the Patient Health Questionnaire-4 (PHQ-4) in the general population. *J Affect Disord*. 2010;122:86–95.
†Statistically significant difference with $p < 0.05$ (paired *t* test).
‡Statistically significant difference with $p < 0.05$ (unpaired *t* test).

importance compared with objective clinical parameters. Especially in plastic surgery, success depends greatly on the patient's subjective satisfaction.[21] In earlier studies, our research group was able to report that various plastic procedures are able to improve many aspects of quality of life after elective operations.[5,6,22–26] However, transgender male-to-female patients are primarily interested in a female appearance rather than a perfect appearing body. They must meet high diagnostic criteria to be eligible for sex reassignment surgery and usually require multiple operations to achieve their goals. In addition, they face many bureaucratic obstacles regardless of the fact

that gender dysphoria is a recognized disease in the *International Classification of Diseases, 10th Revision* (F64.0),[27] whose costs are covered by German health insurers once the diagnosis is established. Even though it is hard to draw a line where medical necessity ends and aesthetic desires begin, transgender surgery ought not to be confused with purely cosmetic procedures performed during one appointment. The basis for sex reassignment surgery is a definite psychiatric diagnosis. The questions remain the same: Does sex reassignment surgery improve the general quality of life? Are there any effects on the patient's emotional status, self-esteem, and depression? With our experience in quality-of-life research, we aimed to test our hypotheses as statistically accurately as possible, thus using standardized validated questionnaires with access to the norm data from German control populations and designing the study in a prospective setting.

The demographic data we gathered of our patients were similar to those of other retrospective studies.[28,29] The age distribution most likely relates to the fact that patients usually choose to undergo sex reassignment surgery before starting a professional career or after establishing themselves in a working field.[30]

Patient satisfaction was high overall, and several items improved significantly after sex reassignment surgery in all three Questions on Life Satisfaction (German version) modules (Tables 1 through 3). Moreover, each one of three time-1 sum scores showed significantly higher results compared with baseline data. The highest improvement in the General Satisfaction module was the item "partner relationship" ($p < 0.01$) because having satisfactory genital organs is a key factor in the majority of intimate relations. Its time-1 score ended up being even higher than German norm values. Interestingly, in the Body Image module, some items showed improvements even though no interventions on these body parts took place in our clinic, for example, "mouth" ($p = 0.05$) or "shoulders" ($p = 0.03$). Most likely, the impact of sex reassignment surgery on the overall body image satisfaction, which is represented by the increased sum score ($p < 0.01$), was so massive that it even affected other anatomical regions. In a retrospective study with both male-to-female and female-to-male patients, however, our research group showed that, 3.2 years after sex reassignment surgery, the sum scores of the General and Health modules were significantly lower than norm values. In that report, we eventually concluded that our results would require further testing, separately for transgender men and women.[31] In addition, we were able to demonstrate that, postoperatively, our patients had significantly increased emotional stability ($p = 0.03$), stronger self-esteem ($p = 0.01$), and lower depression or anxiety ($p < 0.01$) while still maintaining a high response rate.

World literature about quality of life and sex reassignment surgery has increased in recent years, as more patients tend to decide in favor of transgender surgery. Numerous studies do show positive results for patients after male-to-female sex reassignment surgery,[32] yet they rarely use standardized tools and therefore do not provide objective data comparable to norm populations. Their major focus is usually patient satisfaction with surgical and functional results. In our opinion, these studies fail to demonstrate the detailed evaluation of the operation's outcome and the patient's everyday life. Satisfaction with the operative results does not necessarily correlate with overall patient satisfaction.[31] Others examine only physical aspects after surgery,[33] design retrospective studies to gather data after many years and risk recall bias, or even include patients who underwent sex reassignment surgery performed by different surgeons.[29,34] These factors may lead to data that are more inconclusive and result in poor return rates of questionnaires. A personal communication between the examining study physician and the patient is important to achieve a high postoperative response rate as in our report (83 percent) and to avoid a loss-to–follow-up bias.

The single available prospective study about male-to-female transgender patients using standardized questionnaires included only breast augmentation procedures. It showed psychological improvements correlating to our patients who reported significantly higher satisfaction with their breasts ($p < 0.01$) (Table 3).[35]

CONCLUSIONS

Sex reassignment surgery absolutely affects the quality of life of transgender women positively. Using various standardized measuring tools, such as the Questions on Life Satisfaction, Modules (German version), the Freiburg Personality Inventory, the Rosenberg Self-Esteem Scale, and the Patient Health Questionnaire-4, we were able to meet the two vital components in assessing quality of life: multidimensionality and subjectivity.[36] This study showed overall favorable results of sex reassignment surgery in each one of the four standardized questionnaires.

After a thorough MEDLINE search of international literature, no other prospective study has been identified that assessed quality of life after transgender surgery. There is also a paucity of data resulting from standardized validated questionnaires in retrospective reviews. In addition, more research will be necessary to compare our findings to those of different surgical techniques. A study designed with a control group of transgender patients who decided not to undergo sex reassignment surgery is definitely desirable too, because sex reassignment surgery is not free of risks. Kockott and Fahrner already stated that, over time, only sex reassignment surgery leads to significant improvements for male-to-female patients. Unfortunately, their study was retrospective and did not include standardized questionnaires.[37] Long-term prospective results (>5 years postoperatively) would be a further valuable contribution to evaluate our findings.

The results of this study might even be helpful for various governmental lawmakers, health care systems, medical societies developing guidelines, and health insurance companies that are sometimes hesitant to cover the costs of these procedures by classifying them as purely "aesthetic."[38] Therefore, our research group already presented parts of these results at the 26th Annual Meeting of the European Association of Plastic Surgeons, in Edinburgh, United Kingdom.[39]

Ultimately, medicine is on the right track to support patients who suffer from gender dysphoria, although we do not fully understand its etiopathogenesis.[40] Regarding the low procedure risk and the highly improved quality of life, male-to-female sex reassignment surgery continues to be a worthy consideration for affected patients who wish to adjust their sex operatively toward their desired phenotype. Nevertheless, secondary procedures are common, and patients must be informed that these are often necessary to achieve the best possible outcome.

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